

AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows:

1. (Original) A method for facilitating writing and retrieval in a content addressed storage (CAS) system utilizing a Logical Unit Number/Logical Block Address (LUN/LBA) interface comprising steps of:
 - a. receiving an input/output (I/O) operation request, associated application-level LUN/LBA combination, and optionally, content data from an application program at a first LUN/LBA processing tier or at a second OID processing tier,
 - b. hashing said content data to generate an OID at said second OID processing tier if content data is received in said receiving step,
 - c. consulting a high-level OID table and an access property with said received application-level LUN/LBA combination or said generated OID to determine whether said content data can be retrieved from or written to an LUN/LBA combination, respectively, andbased on said consulting step, performing at a third storage subsystem LUN/LBA processing tier actions comprising: a write, over-write, or addition operation to an LUN/LBA combination, a retrieval from an LUN/LBA combination, and a denial of operation.
2. (Currently amended) A method for facilitating writing and retrieval, as per claim 1, wherein said high-level OID table and a [said] low-level OID table are updated if said content data is written to an LUN/LBA combination.

3. (Currently amended) A method for facilitating writing and retrieval, as per claim 1, wherein said consulting step occurs at said first LUN/LBA processing tier, if said receiving step occurs at said first LUN/LBA processing tier, and at said second OID processing tier, if said receiving step occurs at said second OID processing tier.
4. (Currently amended) A method for facilitating writing and retrieval, as per claim 1, wherein said high-level OID table is comprised of at least: an LUN/LBA combination, and an associated OID or plurality of OIDs.
5. (Currently amended) A method for facilitating writing and retrieval, as per claim 1, wherein said low-level OID table is comprised of at least: an LUN/LBA combination, an associated OID or plurality of OIDs, and a counter associated with each OID.
6. (Original) A method for facilitating writing and retrieval, as per claim 1, wherein said access property is one of a: write-once, write-many, or write-many with versioning property.
7. (Original) A method for facilitating writing and retrieval, as per claim 6, wherein said write-once property allows a write operation, if an LUN/LBA combination contained in a high-level table has an associated OID with a null value, and a denial of operation otherwise.
8. (Original) A method for facilitating writing and retrieval, as per claim 6, wherein said write-many property allows operations comprising: a write operation, if an LUN/LBA

combination contained in a high-level table has an associated OID with a null value, and a re-write operation, if an LUN/LBA combination contained in a high-level table has an associated OID with a non-null value.

9. (Original) A method for facilitating writing and retrieval, as per claim 6, wherein said write-many with versioning property allows operations comprising: a write operation, if an LUN/LBA combination contained in a high-level table has an associated OID with a null value, and an addition operation, if an LUN/LBA combination contained in a high-level table has an associated OID or plurality of OIDs with non-null values.
10. (Original) A method for facilitating writing and retrieval, as per claim 1, wherein said write operation comprises steps of writing an OID generated from a hash of said content data to either one of, or both, a high-level OID table and a low-level OID table and writing said content data to an LUN/LBA combination.
11. (Original) A method for facilitating writing and retrieval, as per claim 1, wherein said over-write operation comprises steps of updating an existing OID with an OID generated from a hash of said content data associated with an LUN/LBA combination in either one of or both a high-level OID table and a low-level OID table and writing said content data to an LUN/LBA combination.
12. (Original) A method for facilitating writing and retrieval, as per claim 1, wherein said addition operation comprises steps of adding to an OID list in either one of or both a high-level OID table and a low-level OID table, an OID generated from a hash of said

content data associated with an LUN/LBA combination and writing to an LUN/LBA combination said content data.

13. (Currently amended) A first LUN/LBA processing tier in a content addressed storage (CAS) system performing actions comprising:
 - a. receiving an input/output (I/O) operation request, associated application-level LUN/LBA combination, and optionally, content data from an application program,
 - b. passing said content data to a second OID processing tier if content data is received from said application program,
 - c. using said application-level LUN/LBA combination received from said application program or using an OID returned from second OID processing tier if said content data was passed to said second OID processing tier in previous step to determine whether corresponding or same OID exists in a high-level OID table,
 - d. determining whether a write, over-write, or an addition operation is allowed or if an operation is denied, based on said ~~determining~~ step of determining whether corresponding or same OID exists in said high-level OID table and said access property,
 - e. passing said operation information and either: an OID if a retrieval operation is requested or an LUN/LBA address combination element location and associated content data for any other operation, and
 - f. updating said high-level OID table with a new OID for an associated application-level LUN/LBA if a write, over-write, or an addition operation is allowed.

14. (Currently amended) A second Object ID (OID) processing tier in a content addressed storage (CAS) system performing actions comprising:
- a. receiving an application-level LUN/LBA address combination and optionally, content data from either an application program or a first LUN/LBA processing tier,
 - b. receiving a received [an] OID from said [a] first LUN/LBA processing tier if said content data is not received,
 - c. hashing said content data to generate a generated [an] OID if said content data is received,
 - d. determining a physical LUN/LBA by using said received OID to consult a low-level OID table,
 - e. determining whether a generated [an] OID exists in a high-level OID table by comparing said generated OID to stored OIDs stored in said high-level OID table,
 - f. updating said high-level OID table with said generated OID if said generated OID does not exist in said [a] high-level OID table,
 - g. passing a write request, said ~~received~~ content data, and a location of OID in said low-level OID table to a third storage subsystem LUN/LBA processing tier if said content data is received in ~~receiving~~ step a, based on ~~said determining~~ step d and operations allowed by an [said] access property,
 - h. updating said [a] low-level OID table with said generated OID and incrementing a counter associated with said generated [an] OID, if said [a] write request and said content [associated] data are [is] passed to said third storage subsystem LUN/LBA processing tier,

- i. passing a retrieval request and a physical LUN/LBA combination to said third storage subsystem LUN/LBA processing tier if said received [an] OID was received in ~~receiving~~ step b, based on ~~said-determining~~ step e and operations allowed by said access property,
 - j. passing to said third ~~a first~~ LUN/LBA processing tier said received OID if said [a] write request and said content ~~associated data~~ are [is] passed to said third storage subsystem LUN/LBA processing tier, and
 - k. receiving said content data from said third storage subsystem LUN/LBA processing tier, if said [a] retrieval request and said physical LUN/LBA are [is] passed to said third storage subsystem LUN/LBA processing tier.
15. (Currently amended) An third storage subsystem LUN/LBA processing tier in a content addressed storage (CAS) system performing actions comprising:
- a. receiving from a second OID processing tier a write request or a retrieval request and associated data,
 - b. using an OID received from said second OID processing tier to determine associated LUN/LBA combination,
 - c. writing to an LUN/LBA combination if a write request and associated content data is received,
 - d. retrieving from an LUN/LBA if a retrieval request and an associated OID is received,
 - e. re-hashing content data retrieved from an LUN/LBA combination if a retrieval request and an associated OID is received,

- f. comparing results of re-hashing step with an OID associated with said LUN/LBA combination stored in a low-level OID table, and
- g. passing to [an] said second OID processing tier content data if a retrieval request and an associated OID was received.

16. (Currently amended) A system for Content Addressed Storage (CAS) [CAS] having a Logical Unit Number/Logical Block Address (LUN/LBA) ~~an LUN/LBA~~ interface comprising:

- a. a first LUN/LBA processing tier configured to receive at least a high-level LUN/LBA combination and optionally content data from an application,
- b. a second OID processing tier configured to provide an OID, either by generating said OID from said content data optionally received by said first LUN/LBA processing tier, or by receiving said OID from said application,
- c. a storage subsystem LUN/LBA processing tier configured to receive said OID provided by said second OID processing tier and to access a low-level LUN/LBA combination,
- d. a first table providing a correspondence between [a] said high-level LUN/LBA combination and [an] said OID ~~or plurality of OIDs~~, and
- e. a second table providing a correspondence between [a] said low-level LUN/LBA combination and [an] said OID ~~or plurality of OIDs~~.

17. (Cancelled).

18. (Currently amended) A system for CAS having an LUN/LBA interface, as per claim 16, wherein said second ~~low-level~~ table is ~~comprised of at least: an LUN/LBA combination, an associated OID or plurality of OIDs, and~~ comprises a counter associated with each said OID.
19. (New) The first LUN/LBA processing tier according to claim 16, further comprising:
- a. means for receiving an input/output (I/O) operation request ,
 - b. means for using said high-level LUN/LBA combination received from said application program or using said OID from said second OID processing tier if said content data was passed to said second OID processing tier to determine whether said OID exists in said first OID table,
 - c. means for determining whether a write, over-write, or addition operation is allowed, based on whether said OID exists in said first OID table and based on said access property,
 - d. means for passing information on whether said operation is allowed and either: an OID if a retrieval operation is requested or an LUN/LBA address combination element location and associated content data for any other operation, and
 - e. means for updating said first OID table with a new OID for an associated high-level LUN/LBA if a write, over-write, or addition operation is allowed.
20. (New) The second OID processing tier according to claim 16, further comprising:
- a. means for receiving said OID from said first LUN/LBA processing tier if said content data is not received,

- b. means for hashing said content data to generate said OID if said content data is received,
 - c. means for determining whether said OID exists in said first OID table by comparing said OID to stored OIDs stored in said first OID table,
 - d. means for updating said first OID table with said OID if said OID does not exist in said first OID table,
 - e. means for passing a write request, said content data, and a location of OID in said second OID table to said storage subsystem LUN/LBA processing tier, based on operations allowed by an access property,
 - f. means for updating said first OID table with said OID and incrementing a counter associated with said OID, if said write request and said content data are passed to said storage subsystem LUN/LBA processing tier,
 - g. means for passing a retrieval request and said low-level LUN/LBA combination to said storage subsystem LUN/LBA processing tier, based on operations allowed by said access property,
 - h. means for passing to said LUN/LBA processing tier said OID if said write request and said content data are passed to said storage subsystem LUN/LBA processing tier, and
 - i. means for receiving said content data from said storage subsystem LUN/LBA processing tier, if said retrieval request and said low-level LUN/LBA are passed to said storage subsystem LUN/LBA processing tier.
21. (New) The storage subsystem LUN/LBA processing tier according to claim 16, further comprising:

- a. means for receiving from said second OID processing tier a write request or a retrieval request and associated data,
- b. means for using said OID received from said second OID processing tier to determine associated LUN/LBA combination,
- c. means for writing to said low-level LUN/LBA combination if said write request and associated content data is received,
- d. means for retrieving from said low-level LUN/LBA if a retrieval request and an associated OID is received,
- e. means for re-hashing content data retrieved from said low-level LUN/LBA combination if said retrieval request and said associated OID is received,
- f. means for comparing results of re-hashing step with an OID associated with said LUN/LBA combination stored in said second OID table, and
- g. means for passing to said second OID processing tier content data if said retrieval request and said associated OID was received.